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Chris Carter – Digital Beings: An Opportunity for Australian Visual Effects

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Ongoing innovation in digital animation and visual effects technologies has provided new opportunities for stories to be visually rendered in ways never before possible. Films featuring animation and visual effects continue to perform well at the box office, proving to be highly profitable projects. *The Avengers* (Whedon, 2012) holds the current record for opening weekend sales, accruing as much as $207,438,708 USD and $623,357,910 USD gross at time of writing. *Life of Pi* (Lee, 2012) at time of writing has grossed as much as $608,791,063 USD (Box Office Mojo, 2013). With so much creative potential and a demonstrable ability to generate a large amount of revenue, the animation and visual effects industry – otherwise known as the Post, Digital and Visual Effects (PDV) industry – has become significant to the future growth and stability of the Australian film industry as a whole. Despite its importance to filmmakers, however, the industry is not always economically stable, as indicated by the recent bankruptcy and closures of international award-winning visual effects companies. As I will argue, this digital disruption has provided new points of entry for Australia to reposition itself as a world leader in the global PDV industry. The continued need for digital beings that appear in the same diegetic space as live action actors is a niche within the PDV industry that Australia in particular is well-positioned to leverage for its future economic benefit.

Digital technologies, promising to simplify and speed up the creative process, have in many ways led instead to a more complicated, interdependent and at times heterogeneous production pipeline that presents some unique challenges to the visual effects industry. Current research activity in the field of PDV is primarily concerned with developing new technologies; however, a recent study (Dodgson et al., 2010) conducted across a number of London visual effects and post production houses reveals that some of the biggest problems facing the visual effects industry today are not limited to technological development. Knowledge of how, when and to what purpose one may employ certain technologies is proving to be an ongoing issue. More specifically, the study makes it clear that many young digital artists are, in fact, far less knowledgeable about these factors than their non-digital predecessors. Lacking understanding of the purpose of the production pipeline can cause complications and delays for later stages of the production process (Dodgson et al., 2010).

In addition to limited technical knowledge, managing client expectations has emerged as a problem area within the field that requires attention. This may be the result of digital technologies causing visual effects to become so pervasive that they are now taken for granted by clients who no longer consider effects to be particularly "special." One notable contemporary example is the film *Black Swan* (Aronofsky, 2010), which features as many as 210 visual effects shots integrated with live action footage (Fordham, 2011). The implication here is that because visual effects can be seamlessly integrated with live action, the spectator often is not aware that what they are seeing is the result of the time-consuming and labour-intensive efforts of a visual effects artist This often resulting in minimal audience ability to determine which effects are straightforward to produce and those which are extraordinarily expensive or painstaking (Dodgson et al., 2010). *Life of Pi* is a notable example of this, as the integration of digital creatures and digitally constructed environments makes it difficult to distinguish live-action elements from digital animation and visual effects. Clients of visual effects houses, who are exposed to such spectacle without fully perceiving the point of demarcation between the filmed live action events and the digitally-constructed or enhanced elements of the

image, run the risk of developing unrealistic expectations for what is achievable within limited budget constraints. Unrealistic expectations of this nature place additional pressure on visual effects production budgets, which results in studios competing for work on a global scale.

The quantity of digital image manipulation in contemporary films, the standardization of tools and techniques, along with the increasingly fluid and global PDV workforce has led to the commoditization of much of the PDV work. For example, crucial but labour-intensive tasks, such as the digital removal of suspension wires used to hold actors in mid-air or make them appear to fly, and the conversion of 2D films to 3D stereoscopic footage have been lost to the cheaper labour markets of India and China. Producers are able to reduce their postproduction costs by finding businesses willing to provide these services for little payment, largely because the post-production sector is highly competitive and many businesses worldwide are struggling to find ongoing projects and work. Budgets for postproduction that would seem appropriate during financing stage are reduced to much lower levels once the project begins (Screen Australia, 2010, p. 92).

Competing for work on cost alone in this global economy is proving to be an unsustainable business model for the PDV industry, particularly in terms of living wages. With continued global pressure from countries such as India and China, countries such as Australia have little chance of producing labour-intensive work at a lower cost. It is imperative to the sustainability of the industry then, that Australia focus on developing efficient and effective creative processes, technologies and business models that encourage local production based on innovation and creativity before cost. The integration of digital beings into live action is a niche within production and the Australian PDV industry, as I will outline below, has a well-established history as a world-class provider of services in this area.

According to Screen Australia's submission to the Australian Government's 2010 Review of the Independent Screen Production Sector, seventy-two percent of the total income earned by PDV facilities between 2005 and 2009 was from providing visual effects services. As much as 55 per cent of expenditures were spent on projects that included character or creature integration, with many CG characters interacting with a physical location. This included work on *Charlotte's Web* (2006), *Superman Returns* (2006), *The Ruins* (2008) and *Where the Wild Things Ar*e (2009) (Screen Australia, 2010). Moreover, from 2005 to 2009, much of the work being outsourced from the USA to Australia was eligible for a government incentive known as the Post, Digital and Visual effects production offset. The PDV Offset is a thirty per cent rebate on qualifying PDV expenditure. Another production incentive, the "Location Offset," provided a 16.5 percent rebate on qualifying Australian productions. Taken together, the PDV Offset and Location Offset provided a strong incentive for much creature/character integration being carried out in Australia, using Australian locations. More recently, however, the strength of the Australian dollar, coupled with rebates available in other countries (such as Canada, for example) has caused a reduction in the availability of visual effects work in Australia.[1]

Government incentives have successfully encouraged PDV production in Australia, but such incentives can unfortunately result in an unstable industry that expands and contracts with project cycles. Project completion can result in a loss of employment and a need for PDV artists to travel abroad to find the next project, which in turn results in the lack of a sufficiently skilled local workforce when projects are again sourced from overseas. For example, as many as 600 employees found themselves without jobs after *Happy Feet Two* (2011) underperformed at the box office. Without any other animated feature films in production, Sydney-based Dr. D Studios was not able to offer continuity of employment to staff (Baker, 2011, p.8). A reliance on service work sourced from mainstream Hollywood "runaway" productions is ultimately damaging the Australian PDV industry artistically and financially.

The integration of digital creatures remains one of the most creatively and technologically-challenging areas of PDV and consequently impacts heavily upon the cost of production. The Australian PDV sector has contributed to an extensive range of highly successful visual effects films. Yet despite the local talent pool, very

few Australian productions have made use of the narrative and stylistic opportunities offered by the inclusion of digital creatures. This is potentially due to the cost of production inhibiting the creation of digital creatures along with a lack of producers and directors with a detailed understanding of how to implement efficient and effective visual effects.

Although it downplayed its Australian roots through the use of American actors and Hollywood distribution, *Daybreakers* (M. Spierig et al., 2009), appears to be one of the few if not the only recent Australian productions to make use of digital characters. What is significant about this production is that the directors were actively involved in the production of the visual effects, creating as many as three hundred of the visual effects shots themselves (Rogers, 2010). Nor was *Daybreakers* the first feature film on which these two directors have been actively involved in the creation of the visual effects. One of their earlier films, *Undead* (M. Spierig et al., 2003), featured as many as 305 visual effects shots created mainly by the directors themselves using "off the shelf" software. Arc FX provided additional support for character shots that became too time consuming or difficult for the directors to handle (Lions Gate Entertainment, 2005). This level of director involvement in the creation of visual effects is not typical for feature film production.

Daybreakers and *Undead* exemplify the significance of being able to match client expectations with project scope and available budget. Having a developed understanding of visual effects production gives clients such as directors and producers creative freedom while remaining financially responsible. With regards to digital beings, the creation and integration of a believable creature or character within the same diegetic space as live action actors remains creatively and technically complicated. This can lead to directors and producers becoming somewhat disengaged with the creative process, which not only impacts heavily on the cost of production but can also result in major implications for the final aesthetic outcomes (Okun et al., 2010, p. 37). The complexity of creating digital beings appears to create a barrier to entry for visual effects production, it is precisely for this reason that Australia should pursue it as a niche market that could provide stable production opportunities into the future.

Attempting to hide the artificiality of a digital creature often results in the arousal of an uncanny response in the audience. This is essentially a breakdown in the illusion which animators strive to maintain and consequently prevents audiences from forming an empathetic bond with the characters. While typically linked to human likeness, the uncanny response generated by digital creatures is not limited to digital humans. The movement and behaviour of any digital creature has the ability to arouse an uncanny response in the audience, preventing a breakdown in the illusion continues to be one of the most challenging aspects of believable creature animation. This issue has been clearly demonstrated by the poor reception of films created by Imagemovers Digital, a now-closed animation studio run by director Robert Zemeckis, for which motion-capture and hyper-realism were central to film creation. Films such as *Mars Needs Moms* (S. Wells, 2011), *A Christmas Carol* (Zemeckis, 2009), *Beowulf* (Zemeckis, 2007) and *The Polar Express* (Zemeckis, 2004) have all managed to arouse the uncanny within audiences and critics alike. Borrowing from the field of android science, the term "Uncanny Valley Effect" has been used by the Animation and Visual Effects community to describe the breakdown in the adherence to the traditionally adhered-to principles of the illusion of life.

The term is derived from a 1970 paper written by roboticist Masahiro Mori, in which he described the effect and plotted human familiarity on a graph. According to MacDorman and Ishiguro (2006, p. 299), leading researchers in the field, Mori's assertions that "perceived familiarity increases with human likeness until a point at which subtle deviations from human appearance and behaviour create an unnerving effect" (p. 299). Interestingly, and more appropriate for the field of animation, is that Mori observed an amplification of the effect when movement was added.[2]

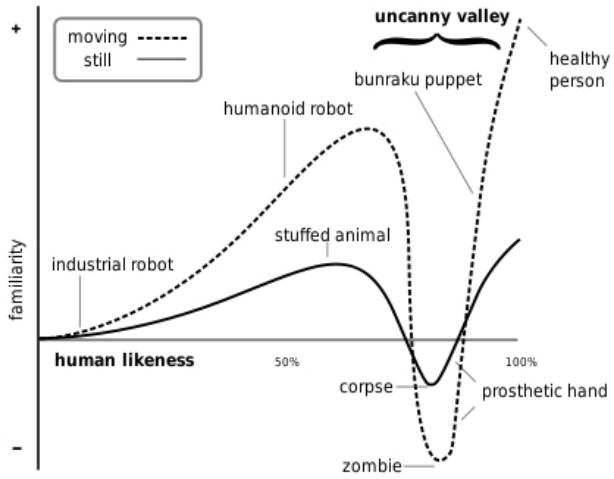

Figure 1: Simplified Figure of Mori's Uncanny Valley (MacDorman et al., 2006, p. 299)

Just as Flueckiger (2008, p. 42), has recognized the limitations of analysing digital characters based on the uncanny valley theory, so too have roboticists such as David Hanson (2006). Hanson offers a preliminary replacement paradigm for the Uncanny Valley, which he calls the Path of Engagement (POE). According to Hanson, we

> propose a preliminary replacement paradigm for the Uncanny Valley. If the illusion of life can be created and maintained, the uncanny effects may be mitigated. It may be that any level of realism can be socially engaging if one designs the aesthetic well. This, in effect, would represent a bridge of good aesthetic, which inspires us to name the revised theory the path of engagement (POE). (Hanson, 2006, p. 4)

Although the uncanny valley theory continues to be a point of ongoing debate, one thing is becomes certain – there is a breakdown in the illusion of life that continues to be problematic for hyper-real animation and further technical research is required to understand how this can be overcome. Hanson's ongoing research has indicated that rather than the definite curve drawn in Mori's uncanny valley graph we should perhaps consider the aesthetic space to be more like a "cloud of aesthetic possibilities" (Hanson, 2006, p. 1). The technical and creative challenges of creating and sustaining the illusion of life of digital beings creates a barrier to entry for many studios, which in turn opens up an opportunity for the Australian visual effects industry to reposition itself as a world leader.

By focusing on further research and production of lifelike digital beings, Australia has the opportunity to become a world leader in a massively profitable market. Films that make use of digital visual effects, particularly those that combine digital beings with live action actors and environments continue to perform well at the box office. The visual effects industry, however, is a labour-intensive and globally-competitive industry. Continued pressure to create stunning visual effects at a reduced cost has put pressure on PDV service providers in countries such as Australia. Trying to provide service work to global productions based on cost is proving to be an unsustainable business model. An approach that is based upon innovation and creativity is one possible way of building a more sustainable industry. In emphasizing more challenging areas of production, there is less liklihood of losing projects to other labour markets. Services such as wire removal, set extension and compositing, for example, are becoming something of a commodity. The decreasing complexity of completing such tasks combined with the equity of access to computers powerful enough to undertake these projects make them easily outsourced to other countries. As I have shown in this paper, the creation of digital beings remains a technologically and artistically challenging niche within PDV that could provide an opportunity for Australia to develop a more sustainable industry focus. Innovation and the development of local expertise in creating believable digital beings may also provide an opportunity for

Australian productions to achieve international box office success.

Chris Carter is a Lecturer at the Queensland University of Technology.

Notes

[1] The Australian and New Zealand PDV industry attracts major international productions. A look at international feature films made in Australia between 2005 and 2009 – the period used in the 2010 Review of the Independent Screen Production Sector – illustrates this point: *Don't Be Afraid of the Dark* (Nixey, 2011), *The Chronicles of Narnia: The Voyage of the Dawn Treader* (Apted, 2010), *X-Men Origins: Wolverine* (Hood, 2009), *Knowing* (Proyas, 2009), *Nim's Island* (Flackett et al., 2008), *The Ruins* (Smith, 2008), *Where the Wild Things Are* (Jonze, 2009), *Australia* (Luhrmann, 2008), *Fool's Gold* (Tennant, 2008), *Superman Returns* (Singer, 2006), *Ghost Rider* (Johnson, 2007), *Happy Feet* (Miller et al., 2006), *Charlotte's Web* (Winick, 2006), *Aquamarine* (Allen, 2006), *House of Wax* (Collet-Serra, 2005). In addition to feature films are notable television series and mini-series which include: *The Pacific* (2010), *Nightmares and Dreamscapes: From the Stories of Stephen King* (2006), *The Starter Wife* (2007), *Monarch Cove* (2006)and *Mary Bryant* (Andrikidis, 2005).

[2] The uncanny valley (as described by Mori) is a point of tension amongst researchers, with some, such as David Hanson (Hanson et al., 2005) from Hanson Robotics arguing that the "valley" does not exist with others suggesting that the uncanny valley should be thought of as being more like a wall never to be breached (Tinwell et al., 2009). Much of the research activity concerned with the Uncanny Valley has been centred on asking participants to indicate their emotional response to a variety of examples ranging from cartoon to photo-realistic and trying to plot their responses on a graph. While not intending to diminish the importance or rigour of the research, it does strike me as purely quantitative approach to a subjective and qualitative problem.

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Edited by Amy Ratelle